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ABSTRACT

The main focus of this project was to prepare a handbook of science activities and to disseminate this handbook to K-8 teachers of the hearing-impaired in the State of Indiana. The handbook, titled "Doing Science Using the Learning Cycle," was developed by a select group of teachers and several consultants with expertise in curriculum development. The same teachers that were involved in developing the handbook also conducted 4 inservice sessions throughout Indiana. In these sessions, teachers (n=46) of hearing-impaired children were introduced to the learning cycle teaching strategy and were provided with an opportunity to develop their own lessons using this approach. The project was evaluated via three components. One facet of the evaluation focused on the effectiveness of the project in developing and disseminating information about the learning cycle. A second facet of the evaluation assessed the quality of the handbook. The final phase of the evaluation was directed at teachers' implementation of the learning cycle in science teaching. Overall, all aspects of the project were assessed positively. The teachers felt that the handbook and the inservice sessions were very helpful in introducing them to the learning cycle approach. In addition, they indicated that their students responded very favorably to the learning cycle lessons. (Author)

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ED357958

# Final Report

## The Development, Disemination, and Evaluation of Science Activities for Hearing-Impaired Children

submitted to:

The Indiana Commission for Higher Education

by

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Indianapolis, IN

and

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SE053181

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Charles R. Barman

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## Abstract

The Development, Dissemination, and Evaluation of Science Activities for Hearing-Impaired Children

The main focus of this project was to prepare a handbook of science activities and to disseminate this handbook to K-8 teachers of the hearing-impaired in the State of Indiana. The handbook, titled Doing Science Using the Learning Cycle, was developed by a select group of teachers and several consultants with expertise in curriculum development. The same teachers that were involved in developing the handbook also conducted four inservice sessions throughout Indiana. In these sessions, teachers of hearing-impaired children were introduced to the learning cycle teaching strategy and were provided with an opportunity to develop their own lessons using this approach.

The project was evaluated via three components. One facet of the evaluation focused on the effectiveness of the project in developing and disseminating information about the learning cycle. A second facet of the evaluation assessed the quality of the handbook and the final phase of the evaluation was directed at teachers' implementation of the learning cycle in science teaching. Overall, all aspects of the project were assessed positively. The teachers felt that the handbook and the inservice sessions were very helpful in introducing them to the learning cycle approach. In addition, they indicated that their students responded very favorably to the learning cycle lessons.

Indiana Commission for Higher Education

DWIGHT D. EISENHOWER MATHEMATICS AND SCIENCE EDUCATION ACT

Final Reports
for Projects Funded under 1991 Allocation of Federal Funds

Summary Report

1. Project Number: 90-IND-01

2. Sponsoring Institution: Indiana University School of Education at Indianapolis

3. Project Title: The Development Dissemination and Evaluation of Science Activities for Hearing Impaired Children.

4. Project Director(s): Dr. Charles R. Barman

5. Type of Project: X Individual ___ Consortial

List other members of consortium _____

6. 1 How many school corporations collaborated with (entered into an agreement with or worked on) your project? Append cooperative agreements or other evidence of cooperative planning.

7. 0 How many private schools collaborated with (entered into an agreement with or worked on) your project? Append cooperative agreements or other evidence of cooperative planning.

9. Project Budget

| | |
|---|---|
| $ 59,575.00 | Eisenhower funds |
| 9,112.00 | Institutional funds |
| 1,140.00 | School corporation funds |
| | Other third party funds |
| $ 69,827.00 | Total |

10. Did your project train participants to address the special needs of underrepresented or undeserved groups (see RFP for definitions of those groups of students)? Yes. This project was targeted to work specifically with teachers of hearing impaired children.

11. Project faculty came from

| | |
|---|---|
| | Schools or departments of Education only |
| | Departments of Mathematics or Science only |
| X | Both Science or Mathematics departments and schools or departments of Education |
| | Other departments (specify)_____ |

12. Primary type of instruction provided

| | |
|---|---|
| X | Workshops/seminars (day-long or less) |
| X | Extended workshops/minicourses/summer institutes |
| | Full-term (i.e., semester) college courses |
| | Combination of the above |

13. Primary type of credit offered

| | |
|---|---|
| | Inservice credit but neither undergraduate nor graduate credit (i.e., Continuing Education Units) |
| | Undergraduate credit |
| | Graduate credit (automatic) |
| | Graduate credit (optional) |
| | Certification/recertification credit other than undergraduate or graduate credit |
| X | Non credit |
| | Other (specify)_____ |

14. Number of participants

| | |
|---|---|
| 46 | Teachers |
| | Teacher candidates/students from teacher training programs |
| | Administrators, supervisors |
| | Other school personnel (specify)_____ |
| | Total |

15. Among participants, how many were

a.

| | |
|---|---|
| 44 | Female |
| 2 | Male |
| 46 | Total |

b.

| | |
|---|---|
| 46 | White, non-Hispanic |
| | Black, non-Hispanic |
| | Hispanic |
| | Asian/Pacific Islander |
| | American Indiana/Alaskan Native |
| | Unknown |
| 46 | Total |

c.

| | |
|---|---|
| 43 | Elementary school personnel |
| 2 | Middle school/junior high school personnal |
| 1 | Secondary school personnel |
| 46 | Total |

d.

| | |
|---|---|
| 13 | From rural or sparcely populated school districts |
| 4 | From suburban districts |
| 29 | From urban districts |
| 46 | Total |

16. 46 Number of participants who received training to meet the needs of underrepresented or underserved groups (see RFP for definition of these groups of students).

17. 185 Number of students in classes taught by participating teachers.

## Narrative Report

18. **Recruitment:** Describe recruitment activities and materials (include examples of materials in appendix). Who participated, and how were they selected? Did the project attract the number and type of participants anticipated?

The recruitment for this project was conducted in two phases. The first phase involved the recruiting of ten teachers to serve as materials developers. These individuals were selected from a pool of twenty teachers who had participated in a previously funded project during the 1990 summer and the 1990-91 academic year. Approximately one half of these teachers were from the Indiana School for the Deaf and the other half were from various school districts in the State of Indiana.

The second phase of recruitment involved the notification of all certified teachers of the hearing-impaired throughout the State of Indiana (see Appendix B). This letter was drafted and sent by the Superintendent of the Indiana School for the Deaf. The letter notified teachers that there would be a series of science workshops offered around the State and that they could select the place that was most convenient for them. These workshops were conducted by some of the teachers who participated in the material development phase of the project.

This project did attract the type of participants that were intended. However, it did not receive as many participants as anticipated. The project planned for 75 workshop participants and only 36 attended these sessions.

19. **Cooperative Planning:** Describe role played by school corporations and/or private schools, and by other parties if this was a consortial project, in identifying needs and devising ways to meet those needs.

The idea of this project originated from the teachers who participated in a previously funded project. Therefore, initial planning began in the summer of 1990 with input from Indiana teachers of the hearing-impaired. Subsequent planning occurred between personnel from the Indiana School for the Deaf, project consultants, and individuals from the IUPUI School of Education. The Indiana School for the Deaf took the responsibility of recruiting teachers and organizing the site of the writing phase for this project and the location of the summer science workshops. (These workshops took place in Merrillville, Fort Wayne, Muncie, and New Albany.) Personnel from the Indiana School for the Deaf, the IUPUI School of Education, and members of the project staff jointly planned the details of the writing phase of this project. The science workshops were planned by the project staff and the ten teachers selected to be involved in the material development phase of this project.

20. **Plan of Operation:**

a. Summarize the services/instruction and follow-up activities that your project provided:

The services and instruction provided by this project can be grouped into two categories: (1) Instruction and professional growth of the teachers who participated in the material development phase of this project and (2) Instructional service to teachers who participated in one of the four summer workshops and follow-up activities.

During the material development phase, the project staff conducted a series of seminars for the teacher writers. These seminars provided the teachers with updates in science education and learning. In terms of professional development, this was the first opportunity for these teachers to engage in writing materials for other teachers. (The final product of this writing phase was a manual titled "*Doing Science Using the Learning Cycle.*") Several teachers from this group were involved in presenting the science workshops throughout the State. These individuals also made presentations at two professional teachers organizations (the 1992 annual meetings or the Hoosier Association of Science Teachers, Inc. and the Indiana Federation Council for Exceptional Children). (Please see Appendix C.) These experiences provided an excellent opportunity for specific teachers to be involved in mentoring roles.

The teachers who attended the summer workshops were provided with information about science process skills and the relationship between science and language development and were introduced to a teaching strategy known as the learning cycle. Each participant received a copy of the manual "*Doing Science Using the Learning Cycle.*" In addition, those participants who chose to apply the information gained in the workshop to their classroom teaching, were provided with follow-up support from the project staff during the 1991-92 academic year. These teachers received critique and assistance in developing and implementing lessons that follow the learning cycle format.

b. Describe the impact you believe your project has had on participants. What is the evidence that they are using concepts, techniques, materials, activities or information from project activities in their classrooms?

The four summer workshops provided 36 teachers of hearing-impaired children with a good foundation in science process skills and the learning cycle, as indicated on the written evaluations the participants completed. Furthermore, these 36 teachers received a useful resource handbook to facilitate their science teaching. One half of the participants (18) provided written evidence of their use of learning cycle science lessons along with their assessment of the lessons. These reports were positive and are described in more detail in response to item 21. Twelve of these 18 teachers sent further evidence of their use of the learning cycle in their science lessons. The lessons they had written were evaluated by the project directors and rated as complete, positive examples of the learning cycle. These teachers further reported on the students' reactions to and learning from this process of teaching science. Please refer to item 21 for more detail.

c. Describe what your project did to address needs of teachers from private schools. What do you know about the effectiveness of those activities?

There were no private schools involved in this project. The private schools in the State of Indiana do not provide services for hearing-impaired students.

d. Describe what your project did to address needs of underserved/underrepresented students (students who were minority or female, students with limited English proficiency, handicapped students, migrant students). What do you know about the effectiveness of those activities?

This project focused on providing information about science teaching and materials to teachers of hearing-impaired students. These students have limited English proficiency and are physically handicapped. Therefore, all of the project's activities directly or indirectly focused

on teaching science to underserved/underrepresented students. The effectiveness of these activities are described in item 21.

e. Describe what your project did to address needs of gifted and talented students. What do you know about the effectiveness of those activities?

The learning cycle is a teaching approach that allows students to take charge of their own learning. Therefore, this approach provides a format for students with all levels of ability to explore and gather information about specific topics. However, data are not available to determine whether gifted students were part of the student population who were impacted by this project.

f. Describe what your project did to address needs of minority teachers; teachers of underserved/underrepresented students; teachers of low income students or students from sparsely populated areas. What do you know about the effectiveness of those activities?

This project was targeted at teachers who work specifically with underserved/underrepresented students. Please refer to item 21 for a description of the effectiveness of the project's activities.

21. **Evaluation**: Describe how your project's effectiveness was assessed with respect to participating teachers; other participants; and participating teachers' students.

The project's effectiveness was assessed in three ways. First, the material development phase was assessed by interviewing the ten participants individually at the end of the conference. Each participant was asked four questions: expectations of the conference, description of the activities, reaction to the concept of a writing conference and thoughts regarding the handbook being produced. Secondly, the summer workshops were evaluated by both the workshop facilitators and participants using written instruments. (Copies are included in Appendix D). Both groups assessed the facilitators' abilities, the workshop materials, and the workshop activities.

Thirdly, the utilization of the handbook materials in the participants' classrooms was assessed by participants' self-reports about lessons presented at two different times during the school year. The first time, in the Fall, 1991, the teachers were required to use in their classrooms one of the units in the published handbook. At the end of the unit, they were required to complete a written instrument (see Appendix D), to report on the effectiveness of the unit and the students' reactions to the learning cycle method of teaching. In the Winter, 1992, the participants were required to submit to the project directors a learning cycle lesson they had created and used, along with an assessment of how the students responded to the lesson. In return, the teachers received written comments about the lesson they had submitted.

Overall, the material development phase was rated highly by the ten participants during the individual interviews conducted. For the most part, they came to the workshop with expectations consistent with the project directors' plans; to write a handbook and to design a workshop for teachers. Generally, the participants were satisfied with this phase and with the necessary amount of writing, critiquing, and re-writing. This conference was a challenge in terms of writing for other teachers, critiquing colleagues' work, and re-writing lessons in response to suggestions made. Individuals spoke highly of the support and teamwork the process

instilled. Others noted that they learned more about the learning cycle from the process, and they gained more confidence in using the learning cycle. While individuals also described the process as frustrating and humbling at times, overall, the process was considered positive, and individuals felt good about the product, the handbook.

Overwhelmingly, the participants liked the idea of a writing conference to produce a specific, useful product. As one individual stated, this experience was a true "work" shop. The participants spoke very highly about having teachers write the handbook and serve as the presenters at the statewide workshops. The participants noted that the particular value of the handbook was that it was written by teachers and included lessons actually taught by teachers. Furthermore, the participants stated that the workshops would be a greater value to teachers, since the presenters would be teachers who can share their classroom experiences. Relatedly, the participants noted that it was valuable to have individuals from different teaching situations working on the project, because the presenters would be able to share a wider range of experiences with the learning cycle with the workshop participants.

The summer workshops were rated highly both the facilitators and participants. The facilitators (9) felt well prepared to direct the workshop, and they were satisfied with the workshop format and materials. It was their impression that the workshops went well. They made no significant suggestions as to how the workshop or the handbook might be improved. In fact, the facilitators were happy with things as they were.

The workshop participants (36) also were highly satisfied. The experience met their expectations and was applicable to their teaching assignment. The workshop activities were rated very helpful in facilitating the participants' understanding of the learning cycle. The facilitators similarly were rated as effective and helpful in explaining the learning cycle. The handbook received high marks for the information included, and the clarity and helpfulness of the printed lessons. The teachers wrote that they felt prepared to create learning cycle science lessons and they were excited about their inclusion in the coming school year. The majority of participants noted an interest in attending a more indepth workshop about the learning cycle and its application to teaching science.

During the Fall, 1991, 18 teachers (50% of the total) who had participated in the summer workshops returned comment sheets as to their experiences using lessons from the handbook in their classrooms. (A sample comment sheet appears in Appendix D). As to the lessons used from the handbook, the teachers found the organization, directions and presentation of the lessons to be clear and concise. In describing the students' reactions to the learning cycle lessons, the teachers wrote about the students' excitement and enthusiasm for the lessons. A couple of teachers wrote that initially students were resistant to exploring and being actively involved in the lessons, but with experience all the students came to enjoy the learning cycle approach.

The teachers also were asked to compare the students' reactions to the learning cycle lessons to the teachers' typical approach to a science lesson. Consistently, the teachers wrote that with the learning cycle lessons the students were more attentive, more motivated, and they participated more in the lessons. In fact, a couple of teachers noted that the students did not realize they were doing science. Several teachers wrote that the students appeared to master the concept better.

In their comments, the teachers also were asked to write about the perceived differences in their roles as "teacher" in the learning cycle lessons as compared with their typical presentation of a science lesson. While several teachers admitted some difficulty in changing their behavior, most of the teachers described their roles as being a guide, a facilitator. They felt more like a participant in the lesson, and they enjoyed their "new" role. With this new teaching role, teachers wrote of the students being more responsible and learning more.

In January-February, 1992, teachers were asked to submit learning cycle lessons they had created along with another comment sheet about their experiences with the lessons (See Appendix D). Twelve sets of materials were received (33% of total summer workshop participants, 75% of the initial follow-up group). The lessons were analyzed by the project directors. Overall, the lessons were rated very good. The teachers were asked to report: the differences they experienced in preparing the learning cycle lesson versus a typical science lesson, the students' reactions to the lesson, the perceived differences in the students' reactions to the learning cycle lesson as compared with a typical science lesson, and perceived differences in teachers' roles in the two types of lessons.

The teachers found the development of learning cycle lessons to take more time and more planning than their typical science lessons. At the same time, several noted that the experience was more creative and challenging. They were satisfied with the results of their efforts. As to the students' reactions to the learning cycle lessons, all the teachers wrote positively. The students were described as more attentive, more involved and excited about the lessons, as compared to typical science lessons. Teachers perceived that the students understood the concepts presented better. A couple of teachers added that the students were better able to recall and to apply concepts they had learned. Also, a couple of teachers noted the value of the assessment components of the learning cycle lessons. The teachers liked assessing the students' knowledge upfront, in order to adjust the lesson(s) accordingly. With assessment as a part of the lessons, a couple of teachers wrote that the students did not realize they had been "tested."

Teachers wrote of differences they experienced with learning cycle lessons versus their typical science lessons. They wrote positively of the experience. Some referred to having the pressure off of them during the lesson, thus they were more interested in the lesson and more excited participants in the lesson. Other described their role as being more of a facilitator. The majority of responses in some way noted that the students were more involved in their learning, and they were learning more.

To conclude, each phase of the project was assessed positively. The material development phase was successful. It strengthened the participants' knowledge about the learning cycle and facilitated their professional development as writers. The participants were very supportive of the writing conference as a concept and of the notion of teachers preparing workshop materials for teachers. The four summer workshops were rated highly by the facilitators and participants. Both groups indicated that the participants left with a good introduction to and understanding of the learning cycle, as well as a good resource book of lessons prepared by teachers. As to the impact of the project on classrooms and students' learning, one half of the workshop participants (18 of 36) provided evidence and assessments as to their use of the learning cycle in their science teaching. The results of those efforts were reported as positive in terms of the students' attention, interest and participation in learning science. Several wrote that students learned the concepts better. Of the 18 who communicated with the project directors in the Fall, 1991, 12 sent further evidence of their own development and use of

learning cycle science lessons in January-February, 1992. The teachers' reports as to the impact of these lessons on students' participation, interest and understanding of science were positive.

22. **Dissemination**: What efforts have been made to publicize your project or to call other teachers' attention to its accomplishments? Describe what has already taken place and what is scheduled: Press releases, presentations, participants' inservice for their peers, publications, etc. (Please refer to Appendix C for additional information related to the following items.)

Press Releases:

Article appeared in *The Education Outline* , IUPUI School of Education Newsletter October, 1991.

A news article was released by the IUPUI News Bureau. This press release was carried by the following newspapers: Bedford Times-Mail, Indianapolis Recorder, and the Indianapolis Star.

Presentations:

"Doing Science Using the Learning Cycle," 1992 Hoosier Association of Science Teachers, Inc. annual meeting in Indianapolis, IN (presenters: Charles Barman,IUPUI School of Education; Natalie Barman, Park Tudor School; Tony Young, Indiana School for the Deaf (ISD); George Houk, ISD; Mary Glen Cullison, ISD)

"Doing Science Using the Learning Cycle," 1992 Indiana Federation Council for Exceptional Children annual meeting in Indianapolis, IN (presenters: George Houk, ISD and Rhonda Benz, New Albany School Corporation)

"Using Learning Cycles to Enhance Concept Development," 1992 National Science Teachers Association annual meeting in Boston, MA (presenters: Charles Barman and Natalie Barman)

"The Learning Cycle: An Effective Teaching Strategy," 1992 Spring Meeting of IUPUI University Supervisors, IUPUI School of Education, Indianapolis, IN (presenters: Charles Barman, George Houk, Mary Glen Cullison, and Tony Young.)

"Doing Science Using the Learning Cycle," presentation made at 1992 Project to Improve Methods Courses in Elementary Science, Wichita State University, Wichita, KS (presenter: Charles Barman)

Publications:

Barman, C., Barman, N. & Cullison, M.G. (eds.) (1991)Doing Science Using the Learning Cycle, Indiana University-Purdue University at Indianapolis School of Education, Indianapolis, IN.

Barman, C., Benz, R., Haywood, J. and Houk, G. (in press) "Science & the Learning Cycle," Perspectives in Education and Deafness.

Barman, C., Colen, M. & Shedd, J. (in press) "A Science Inservice Program for Teachers of the Hearing-Impaired: A Rationale and Model," Perspectives in Education and Deafness.

23. **Lessons Learned**: What were the strengths and weaknesses of what you did, or sought to do? What advice do you have for future Eisenhower project guidelines or future project staff?

Strengths:

1. Having teachers prepare workshop materials and resources for other teachers.

2. Providing follow-up opportunities to work with teachers. That the writing workshop participants had been involved in a learning cycle project with the same project director last summer contributed to the success of this project and enriched the understanding and professional development of the ten teachers.

3. Offering regional workshops to reach a good cross-section of teachers.

4. Providing networking opportunities through the use of teachers as workshop facilitators for a select somewhat isolated group of teachers (teachers of the hearing-impaired).

5. Though it was difficult to promote, teachers' continued participation in the project by way of additional assignments throughout the school year.

Weaknesses:

1. Difficulty in promoting continued project participation throughout the school year.

2. Difficulty in advertising and promoting the summer workshops.

Suggestion:

As a result of this project, we would encourage the Commission to consider and/or to promote projects for teachers that include follow-up either through the school year or from one summer to the next. To achieve classroom application, some form of continued relationship with project participants is valuable.

# Appendix A

# Cooperative Agreement

# Indiana School for the Deaf

1200 East 42nd Street

INDIANAPOLIS, INDIANA 46205-2099

317 - 924 - 4374


October 4, 1990

Dr. Charles Barman
IUPUI
School of Education
902 W. New York
Indianapolis, IN 46202-5155

Dear Dr. Barman,

The Indiana School for the Deaf enthusiastically supports your proposal for providing inservice training for teachers of the deaf in the learning cycle methodology for teaching science to deaf children.

The program you conducted last summer was outstanding. We had positive feedback from all the participants. They are working on the learning cycle with their children and they are looking forward to their follow-up reports at the end of October.

I pledge similar in-kind services as we did last year; facilities, staff, secretarial support, printing, materials, etc. Please let us know exactly what is needed for the 1991-92 proposal.

If you need additional information, please call me at 317/924-8400.

Sincerely,

Lee Murphy

Lee Murphy, Ed.D.
Superintendent



*An Equal Opportunity Employer* *Equality in Services*

EISENHOWER MATHEMATICS AND SCIENCE EDUCATION ACT
COOPERATIVE PLANNING AGREEMENT

1. DESCRIBE THE COOPERATIVE PLANNING WHICH HAS RESULTED IN THIS APPLICATION, INDICATING SPECIFICALLY WHAT SCHOOL CORPORATIONS OR OTHER ENTITIES PARTICIPATED IN THAT PLANNING.

This proposed project was a cooperative effort between the Indiana School for the Deaf (ISD) and the Indiana University School of Education at Indianapolis. The development of this project is an outgrowth of a 1990-91 funded project from the Commission for Higher Education.

2. DESCRIBE HOW THE INSERVICE TRAINING PROGRAM THAT THIS APPLICATION SEEKS FUNDING FOR WILL MEET THE NEEDS OF TEACHERS IN THE CORPORATIONS THAT ARE SIGNATORIES TO THIS AGREEMENT.

This project will develop a handbook of science lessons that will be designed for hearing impaired students in grades K-8. These activities will provide teachers of the hearing impaired with practical examples of lessons that can be incorporated into their science curriculum.

3. IF SECTION 2 DOES NOT ADEQUATELY DESCRIBE THE PROPOSED INSERVICE PROGRAM, ADD A BRIEF DESCRIPTION HERE ABOUT THE PROGRAM AS IT HAS EMERGED FROM THE COOPERATIVE PLANNING DESCRIBED IN SECTION 1.

Participants:

| | Typed Name, Title, Organization | Signature | Date |
|---|---|---|---|
| 1 | Lee C. Murphy, Superintendent of ISD | Lee C. Murphy | 10/17/90 |
| 2 | | | |
| 3 | | | |
| 4 | | | |
| 5 | | | |
| 6 | | | |

etc.

# Appendix B

## Recruitment

# Indiana School for the Deaf

1200 East 42nd Street

INDIANAPOLIS, INDIANA 46205-2099

317 · 924 · 4374


DATE: January 15, 1991

TO: Teachers of the Hearing Impaired

FROM: Lee Murphy, Superintendent
Indiana School for the Deaf

Charlie Barman, Professor
IUPUI, Science Education

SUBJECT: Workshops on Teaching Science to the Hearing Impaired

During the Summer of 1990 20 teachers of the hearing impaired participated in a workshop on teaching science funded by the Indiana Commission for Higher Education Eisenhower Math and Science Education Program through IUPUI.

The focus of the workshop was to develop an awareness of scientific methods, to develop teaching strategies, and to utilize the "Learning Cycle" as a teaching tool during the next school year.

The workshop was a success and the participants have reported their findings - all positive.

A second year grant has been awarded to IUPUI as a follow-up to this initial effort. During the Summer of 1991, 10 of the original participants will develop a handbook on their approach to the teaching of science to hearing impaired children.

This handbook and other information will be shared with other teachers of the deaf throughout the state at different workshops.

The purpose of this letter is to invite you to these workshops as listed below. We will pay you $50.00 per day for the 2 days for attending. You may choose which place you would like to attend.

Please return the enclosed card indicating your willingness to attend one of these workshops. We have enclosed an abstract of the grant proposal. Call us at 317/924-8400 if you have any questions.



*An Equal Opportunity Employer* *Equality in Services*

Workshops:

| | | |
|---|---|---|
| 1. | Merrillville | July 8 and 9 |
| 2. | Fort Wayne | July 15 and 16 |
| 3. | Muncie | July 24 and 25 |
| 4. | Evansville | July 29 and 30 |
| 5. | New Albany | July 31 and August 1 |

Thank you for considering this invitation. We look forward to hearing from you.

cc: Helen Jongleux
Roger Beesley
LEA's
Dr. Merbler - Post

# Appendix C

## Dissemination Efforts

News Bureau
Indiana University-Purdue University at Indianapolis
355 Lansing Street
Indianapolis, Indiana 46202

CONTACT: ALICIA DEAN CARLSON
317/274-7711

FOR IMMEDIATE RELEASE
AUGUST 8, 1991

When they start classes this fall many hearing-impaired Hoosier youngsters will be getting a new dose of science, thanks to a new educational project developed by an IUPUI professor and a team of Indiana educators.

The project, called "Doing Science Using the Learning Cycle," will be taught beginning this fall by teachers of the hearing impaired around the state, including the Indiana School for the Deaf in Indianapolis.

Learning language skills has often taken priority over developing science skills in the education of most deaf children, according to Charles R. Barman, associate professor of education at IUPUI. But Barman says that "doing" science can actually accomplish both goals. Shunning typical textbook and lecture classwork, the science education project stresses learning-by-doing activities that encourage students to explore new concepts.

"In the past, science education has definitely been the missing link in teacher preparation for the hearing impaired," Barman says. "What we're finding is that if hearing-impaired children are engaged in activity-oriented science projects, they're actually being introduced to new situations and new concepts. That leads to new vocabulary and the development of language skills."

Barman directed the science education project, which was funded by the Indiana Commission for Higher Education. The project staff included educators from Indianapolis's Park Tudor School, the Indiana School for the Deaf and I.U.

A new instructional manual for teachers of the deaf was developed by Barman, the project staff and educators from the Indiana School for the Deaf, New Albany-Floyd County Schools, Indianapolis Public Schools, Porter County Interlocal Special Education Division and Muncie Public Schools.

Through workshops conducted by the project staff, Barman estimates that approximately 70 percent of Indiana's teachers for the deaf have been instructed in the science education method outlined in the manual.

-more-



BEST COPY AVAILABLE

The new approach includes activities that help students understand basic science concepts such as earthquakes and volcanoes, endangered animals, recycling and functions of the human body. All the lessons use a strategy called "the learning cycle" which consists of three phases. The "exploration" phase allows students to interact with materials and ideas; during the "concept introduction" phase, students are introduced to concepts and vocabulary; during the third phase, called the "concept application" phase, students apply information they have learned to a new situation.

Teachers at the Indiana School for the Deaf will be putting the learning cycle strategy into action this fall, according to Mary Glenn Cullison, middle school supervising teacher at the school and a member of the project staff. "It is a very visual, hands-on approach to science," she explains. "Deaf children learn visually, so it is an especially good strategy for them. But it is a good approach for any children."

One science lesson for middle school youngsters, for example, begins by giving students 15 or seemingly unrelated objects and a flashlight. The children are asked to group the items according to their shared characteristics. Eventually, the children recognize that light will pass through some of the objects but won't pass through, or will only partially pass through, other items. After the students have made their discovery, the students are introduced to the vocabulary: transparent, translucent and opaque. Students are then asked to apply the information to familiar objects they encounter daily.

"It is quite a different approach from the traditional method in which teachers lecture to students," Cullison says. "Students have to use their thinking skills."

-30-

Note to editors: For more information, call Charles Barman at 274-6801, or call me to arrange an interview. We can help you get interviews and photographs of students "in action," but media requests also must be made with each school. Attached is a list of educators who were involved in writing the new science curriculum for hearing impaired children.

Deaf education/3

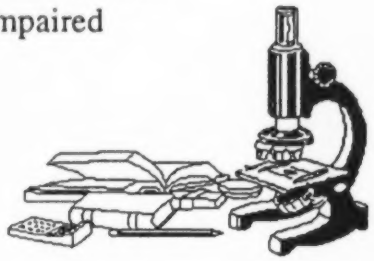
## "Doing Science Using the Learning Cycle"

Project Director: Charles R. Barman

Project Staff: Natalie S. Barman, Park Tudor School; Mary Glenn Cullison, Indiana School for the Deaf; Lee C. Murphy, (formerly) Indiana School for the Deaf; Gwen M. Saffa, educational consultant; Jill M. Shedd, IUPUI

Contributing writers: Rhonda J. Benz, New Albany-Floyd County Schools; Amy R. Hackett, Indiana School for the Deaf; Jodi R. Haywood, Indiana School for the Deaf; George A. Houk, Indiana School for the Deaf; Patricia A. McComas, Indianapolis Public Schools; Melissa M. McEwan, Porter County Interlocal Special Education Division; Susie J. Miller, Muncie Public Schools; Stevia R. Murray, Porter County Interlocal Special Education Division; Jan L. Pool, Porter County Interlocal Special Education Division; Toni K. Young, Indiana School for the Deaf.

## Faculty Member Studies Science Education Method for Use with Hearing-Impaired Students



This fall many hearing-impaired Hoosier youngsters are getting a new dose of science, thanks to an educational project developed by Charles R. Barman, Associate Professor of Education, and a team of Indiana educators.

The project, called "The Development, Dissemination, and Evaluation of Science Activities for Hearing-Impaired Children", is being taught by teachers of the hearing impaired around the state, including the Indiana School for the Deaf in Indianapolis.

Learning language skills has often taken priority over developing science skills in the education of most deaf children, according to Barman. But he says that "doing" science can actually accomplish both goals. Shunning typical textbook and lecture classwork, the science education project stresses learning-by-doing activities that encourage students to explore new concepts.

"In the past, science education has definitely been the missing link in teacher preparation for the hearing impaired," Barman says. "What we're finding is that if hearing-impaired children are engaged in activity-oriented science projects, they're actually being introduced to new situations and concepts. This leads to new vocabulary and the development of language skills."

Barman directed the science education project, which was funded by the Indiana Commission for Higher Education. The project staff included educators from Park Tudor School in Indianapolis, the Indiana School for the Deaf and Indiana University.

The project resulted in a new instructional manual for teachers of the deaf developed by Barman, the project staff, and educators from the Indiana School for the Deaf, New Albany-Floyd County Schools, Indianapolis Public Schools, Porter County Interlocal Special Education Division, and Muncie Public Schools.

Through workshops conducted by the project staff, Barman estimates that approximately 70 percent of Indiana's teachers for the deaf have been instructed in the science education method outlined in the manual.

The workshop sessions centered around introducing teachers to a strategy called "the learning cycle" which consists of three phases. The "exploration" phase allows students to interact with materials and ideas; during the "concept introduction" phase, students are introduced to concepts and vocabulary; during the third phase, called "concept application", students apply information they have learned to a new situation.

One science lesson for middle school youngsters, for example, begins by giving students 15 seemingly unrelated objects and a flashlight. The children are asked to group the items according to their shared characteristics. Eventually, the children recognize that light will pass through some of the objects but won't pass through, or will only partially pass through, other items. After the students have made their discovery, the students are introduced to the vocabulary: transparent, translucent, and opaque. Students are then asked to apply the information to familiar objects they encounter daily.

## SIS Spotlight:
### New Materials, Resource Show

by Lyn LaVigne

Zephyr Press brings us new material in their *Our Only Earth* series. The newest unit (soon to be available at SIS) is entitled *The Energy Crisis* andpoints out the problems of world energy production and consumption and offers a way for students to come up with solutions. Other topics in the *Our Only Earth* series currently available at SIS include tropical deforestation, air pollution, poverty/hunger/overpopulation, war, endangered species, and oceans. Each book informs students on the issue and then empowers them to take action. A variety of activities in each book meets the varying learning styles of students--kinesthetic, visual, musical, interpersonal, and independent. Activities enable all students to experience success while considering how to make the world a better place for all. Interestingly, the series is an implementation of the curriculum developed with more than 2,000 Soviet and American students involved in the International Youth Summits. It is suggested for use with grades 4-12.

**Activity update.** The 10th "Presents" of Mind Resource Show, sponsored by the Indiana Association for Gifted will be held on Thursday, October 24 from 12 to 4 pm in conjunction with the ISTA Convention at the Convention Center. The show includes booths where visitors may learn of resource opportunities for individuals and classrooms. Live performances and demonstrations intermingled with hands-on activities for adults and children make this show unique among presentations of its kind. For all those interested in new opportunities for teaching and learning, this show is a must. It is free to parents, students, and teachers.

perspectives
in Education and Deafness

Gallaudet University
Pre-College Programs
KDES—PAS 6
Washington, DC 20002
202/651-5340, Voice or TDD
Fax: 202/651-5708

December 4, 1991

Mr. Charles R. Barman
Associate Professor of Science Education
Indiana University
902 West New York Street
Indianapolis, IN 46202

Dear Dr. Barman:

We appreciate the chance to review your manuscript, submitted with Rhoda Benz, Jodi Haywood, and George Houk, and titled "The Learning Cycle and Hearing Impaired Students." Our reviewers have recommended the article for publication in Perspectives in Education and Deafness.

If you have access to photos, color or black-and-white, depicting any aspect of the program, we would appreciate being able to consider them for use along with the article. We would be happy to assume responsibility for any expense incurred in their preparation. A copy of our photo guidelines is enclosed.

We hope to schedule the article to appear during the spring of 1992, as space permits. Before publication, a copy of the edited manuscript will be sent for your review. Thank you for your contribution to **Perspectives** magazine.

Sincerely,

Mary Abrams

Mary Abrams, editor
**Perspectives in Education and Deafness**

# Science and the Learning Cycle

*By Charles R. Barman, Rhoda J. Benz, Jodi R. Haywood, and George A. Houk*

*Learning Cycle strategies can be successfully applied in a wide range of subject areas.*

*Phase 1: Explorative activities provide a basis for teaching specific concepts and related vocabulary.*

*Phase 2: Experience and a variety of information are used to introduce the main concept of the lesson.*

*Phase 3: Students solve new problems by applying what they have learned.*

*Ongoing evaluations help the teacher track student learning and provide needed review and correction.*

*Teachers find that learning cycle lessons help create a learning atmosphere of curiosity and excitement.*

*Charles A. Barman is an associate professor of Science Education at Indiana University.*
*Rhoda Benz is a teacher in the New Albany-Floyd County (IN) Schools.*
*Jodi Haywood and George Houk are teachers at the Indiana School for the Deaf.*

Out in the schoolyard, a teacher and her first grade class are purposefully pushing and pulling at the playground equipment. Then the children form teams to play tug-of-war. When one team seems about to pull the other across a line in the sand, the teacher moves a child from one side to the other, tipping the balance in the opposite direction. This is science.

In a fourth grade classroom, students are carefully inspecting, handling, sniffing and even tasting a wide assortment of common materials--things like crayons and foil, raisins, chalk, and paper. Then they write descriptions of each of the materials. This is also science.

Meanwhile, members of a sixth grade class seem to be playing with flashlights. They shine their lights through, on, and against a variety of materials. As they investigate the light in its different forms, the teacher poses discussion questions. Can you see light through the black material? Does the light appear the same on both sides of the paper? Can you see light through the book? This too is science.

## Logical Steps Toward Learning

The Learning Cycle is an instructional strategy that consists of three distinct phases: exploration, concept introduction, and concept application. It can be successfully applied in a wide range of subject areas and learning tasks, including courses designed for deaf and hard of hearing students. Learning cycle strategies are particularly effective as the basis for an activity-oriented elementary science program.

*Exploration:* During the first phase of the learning cycle, the teacher presents students with a task or a problem. The challenge is open-ended enough to let students choose among a variety of strategies, yet specific enough to provide some direction.

This phase engages students in an interesting activity that will serve as the basis for learning a specific concept and related vocabulary. It also gives students an opportunity to air their existing knowledge of the subject matter, and teachers a chance to explain and correct inaccurate information.

*Introducing Concepts:* In the second phase of the cycle, the teacher uses experience and information--including that provided by students--to introduce the main concept of the lesson and appropriate vocabulary. During this step, students should have access to textbook information, visual aids, and other resources that will help clarify the target concept.

*Applying Concepts:* The final phase of the learning cycle challenges students to generalize the concept of the lesson to other situations. They solve new problems by applying what they learned during steps one and two. Ideally, the teacher will assign tasks or problems that relate directly to students' everyday lives.

*Assessment*: Each student's grasp of the concept and its application should be evaluated periodically throughout every phase of the lesson, helping the teacher track learning progress and provide review and correction as needed.



Galley page 1

## Language Development and the Learning Cycle

In 1979, the National Science Teachers' Association (NSTA)published a monograph that detailed studies showing a relationship between vocabulary development and activity-oriented science teaching (Rowe). The author reached several important conclusions.

- o Active experience with science helps students develop language and logical thinking skills.
- o Selected science activities can accelerate reading readiness in young children.
- o Science activities provide a strong stimulus and shared framework for converting experiences into language.
- o Reading skills stem from the development of language and logic, which follows the formation of concepts after repeated encounters with objects and events. Such encounters can be provided by activity-oriented science.

Although the study focused primarily on learning among hearing students, its conclusions apply equally to those who are deaf and hard of hearing (Lang, 1984). For deaf students, as for their hearing peers, personal experiences help create mental models to represent objects and events. Words are the abstract symbols that result from such experiences.

The learning cycle offers a natural progression that strongly supports language development.

- o The exploration phase begins the process by providing initial physical experiences.
- o Concept introduction builds on those experiences and introduces specific vocabulary.
- o Concept application serves as a mechanism to expand and reinforce learning and vocabulary growth.

## Feedback from Teachers

A 1991 study (Barman, Cohen, Furuness, & Shedd), reported the comments of teachers who had used the learning cycle approach in their classrooms. The teachers agreed that the experience and its results altered their philosophies of teaching in a number of ways.

- o The learning cycle approach provided greater flexibility than teaching based strictly on textbook information.
- o Learning cycle strategies made it easier to incorporate a variety of resources in lesson planning.
- o The strategies were readily applicable to the teaching of social studies, language arts, and mathematics as well as science.

The teachers emphasized, however, that moving from traditional textbook teaching to learning cycle techniques is likely to require a period of adjustment. One teacher observed that, "It takes at least one semester for a teacher and students to make the transition from textbook-bound lessons to the learning cycle approach."

Despite any initial difficulty, all of the participating teachers felt that the time invested in adapting to the new approach was well spent. In their classrooms, they found that learning cycle strategies helped increase student motivation, accelerated the growth of cognitive and language skills, and created an atmosphere of curiosity and excitement about learning.

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## Notes

1. The Science Curriculum Improvement Study used the terms exploration, invention, and discovery to describe the three phases of the learning cycle (SIS Handbook, 1974). The last two phases have been renamed to characterize more accurately what happens in each of these segments.

2. The development of these lessons and related materials was supported by the State of Indiana Commission for Higher Education, Grant No. 90-IND-01.

## Lessons for the Learning Cycle

The following lessons, based on learning cycle strategies, were developed by teachers of deaf students. Each is the first of a series of lessons dealing with topics in physical science. The first sample lesson was designed for primary students, the second for upper elementary, and the third for middle school.

### Lesson I: Force
*(primary level)*

*Objective*: Students will identify force as a push or a pull that makes objects move.

*Materials*: rope, paper, crayons

*Approximate time:* Two hours

#### Phase 1: Exploration

o Divide the class into two teams to play tug-of-war.

o During the play, point out the effects of the forces used: the rope moves in response to the pulling of the strongest group.

o On the playground, encourage the children to move the equipment through pushing and pulling.

*Assessment:* Have students draw pictures of the tug-of-war contest and the playground equipment, then circle the activities or toys that involved movement.

#### Phase 2: Concept Introduction

o In class, discuss the fact that some kind of force is necessary to make things move, and that a push or pull is a kind of force.

o Brainstorm other activities that involve force and movement. Classify each of the forces named as a push or a pull.

*Assessment:* Have students use the pictures they drew during the exploration phase, and focus on the elements they have circled--those that involve movement. Ask them to draw red X's on the pictures that involve pushing, and blue X's on those that involve pulling. Then ask them to label the marked pictures either "push" or "pull," as appropriate.

#### Phase 3: Concept Application

o Have students observe their families' activities at home and write down or draw pictures of any activities that involve force.

*Assessment:* Ask students to label each of those forces as a push or a pull.



Galley page

## Lesson II: Physical Properties of Matter
*(older elementary)*

***Objective:*** Students will be able to describe objects by their physical properties, using the five senses.

***Materials:*** crayons, blocks, and erasers of various colors, sizes, and shapes; cotton balls, sandpaper, crackers, apple slices, aluminum foil, rulers, paper and pencils, water in a jar.

***Approximate Time:*** One class period

### Phase 1: Exploration

- Provide a variety of materials like those listed above. Let students examine and discuss the objects among themselves.
- Ask individual students to describe the objects.
- Have students sort the objects into groups. Encourage them to group the objects in various ways, and to explain why they might fit into particular categories.

***Assessment:*** As the students describe and sort the objects, note responses in a chart or record book.

### Phase 2: Concept Introduction

- Discuss the ways students described and sorted the objects.
- Talk about ways of describing things through sight, touch, smell, taste, and hearing as applicable.
- Construct charts listing the characteristics of several familiar objects. Then ask students to observe objects in the classroom and chart their descriptions.

For example: Chalk
Sight: small white cylinder
Touch: hard, powdery
Smell: dry, dusty
Hearing: squeaks on the blackboard

***Assessment:*** Use student charts to check their understanding of the concepts.

### Phase 3: Concept Application

- Pass around various objects and ask students to describe them by listing their properties.
- Play a guessing game: Have students take turns describing things in the room, while the rest of the class tries to guess what is being described.

***Assessment:*** Base student evaluations on the number of different ways they found to describe the objects, and on their participation in the guessing game.

## Lesson III: Properties of Light
*(middle school)*

***Objective:*** Students will identify the different ways lig.. interacts with matter.

***Materials:*** Clear, colored, and etched glass, waxed paper, notebook paper, wood, books, black and colored fabric of various weights, flashlights.

***Approximate Time:*** Two to three class periods.

### Phase 1. Exploration

- Place a variety of materials on a table. Give each student a flashlight. Let them manipulate the materials and the flashlights to discover whether light will travel through each of the substances and how it appears, and make notes of the results.
- While the students are experimenting, ask questions to prompt them to explain what they see. Can you see the light through the material? Why or why not? Is there some light? No light? How does the light that comes through glass differ from light through paper? fabric? a book? Accept all the answers. The object is to help students interpret the meaning of what they see.

***Assessment:*** Evaluate students' responses.

### Phase 2: Concept Introduction

- Discuss students' observations and the categories they have created: materials that let all of the light through, some of the light, and no light at all.
- Read and discuss textbook information relating to transparent, translucent, and opaque materials.

***Assessment:*** Give students a new set or list of materials. Have them label items either transparent, translucent, or opaque.

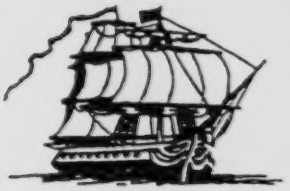
- As a group, check the labels by testing the items with a flashlight; discuss and change labels as needed.

### Phase 3: Concept Application:

- Assign students to locate two examples, at home or in school, of transparent, translucent, and opaque materials. Have them demonstrate and explain why they chose each of the materials.
- Let students choose appropriate types of materials for hypothetical situations. For example, design an office that has a glass wall, but that also affords some privacy. What kind of glass would you choose?

***Assessment:*** As above, list and label the selected materials, then check categories with a flashlight.

# Presenter Confirmation Form
# NSTA National Convention
# Boston, Massachusetts
# March 26–29, 1992



*Science for the New World*
*1492–1992*

*Note:* The information below will be listed in the convention programs. Please check for accuracy.

## PRESENTER DATA:

Name: **Charles Barman**
School/Inst.: **Indiana University**
City, State, Zip: **Indianapolis, IN 46223**
Are you a member of NSTA? (Yes/No)

Dept.: **Science Education**
Address: **902 W. New York St.**
Daytime Phone: **(317)214-6801**

## SESSION DATA:

Session Title: **Using Learning cycles to Enhance Concept Development**

Session Number: **18**
Subject: **Research**
Date: **03/28/92**
Building: **Sheraton Boston**
Note:

Session Type: **Workshop**
Intended Audience: **E**
Time: **1100-1200**
Room: **Fairfax A**

Time Allowed: **60 minutes**
Capacity: **75**

Co-Presenters' Names:
**Charles Barman**
Natalie S. Barman
Park Tudor School
Indianapolis, IN

I agree to be a presenter in the above session.
Signature .....

Date 10-29-91

## PRESIDER DATA:

Do you wish to name the presider for this session? (Yes/No) .....NO
If so, fill in below. (If you do not name one, NSTA may assign a volunteer to preside at your session.)
Individual: **JoAnne Wolf**
School/Inst.: **Resource Center**
City, State, Zip: **Mesa, AZ 85210**

Dept.:
Address: **143 S. Alma School**
Daytime Phone: **(602)890-7056**

## ADMINISTRATOR DATA:

If a letter documenting your participation is required, please provide addressee information below:

Name: .....
School/Inst.: .....
City, State, Zip: .....

Dept.: .....
Address: .....

## AUDIOVISUAL DATA:

*Note:* NSTA cannot guarantee supplying equipment for requests made after November 15.

NSTA will provide up to two pieces for each session of equipment as long as they are not the same type of equipment. VCR and computer must be essential to your presentation and in use for more than 1/2 session time. Put an "X" by desired two pieces.

..... 35mm Slide Projector
(Kodak carousel with 5' x 5' screen)
XX Overhead Projector (Apollo with 5' x 5' screen)
..... Flip Chart (with pad and markers)

..... 1/2" VHS Videocassette Player (with 25" monitor*)
Time ..... min.
..... Macintosh Computer (with 25" monitor)
Time ..... min.

Indiana Federation

Council for Exceptional Children

4967 W.12th. Street; Speedway, IN 46224
317/244-1816(h) 317/232-2944 (w)

November 6, 1991

Mary Glenn Cullison
Indiana School for the Deaf
1200 E. 42nd. Street
Indianapolis, IN 46205

Dear Ms. Cullison:

We are pleased to have you as one of our presenters at the next IFCEC Annual convention. We have arranged the sessions to allow our registrants to follow a strand of related topics throughout the convention.

Your presentation "Doing Science Using the Learning Cycle " is scheduled for Saturday, February 15 from 9:45am until 11:45am. If you have not already done so, please let me know if you are planning to use any audio-visuals, even those you are bringing yourself.

You are the only person to receive this information about your session, so please share it with any co-presenters. If you have any questions please call.

Looking forward to a great convention! See you at the Hyatt Regency!

Sincerely,

Mary M. Thompson

HOOSIER ASSOCIATION OF SCIENCE TEACHERS, Inc.

Dear CHARLES,

Congratulations! Your proposal for the 1992 HASTI Convention, "DOING SCIENCE USING THE LEARNING CYCLE", has been accepted. You are scheduled for a Presentation session on Friday, Jan. 31 from 11:00 am until 12:00 pm in room FSC of the (Adam's Mark Hotel) or the Holiday Inn.

Many excellent proposals were received and I believe this year's program will provide an outstanding selection of activities for all Indiana science educators.

I want to thank you for your assistance in making this convention a success and HASTI a viable organization supporting Indiana Science Education.

When you register at the convention please check at the presenters' table for your packet.

Sincerely,

Rick Crosslin

P.S. This is going to be a fantastic convention. There are double the number of elementary proposals this year (Over 60). We have expanded to the Holiday Inn (Airport) in addition to our normal Adam's Mark location. See you at the Convention.

# Appendix D

# Evaluation Instruments

SCIENCE TEACHING WORKSHOP
FOR TEACHERS OF THE HEARING IMPAIRED

WORKSHOP EVALUATION

Please fill in the following information:

Workshop Site: _____

Name: _____

Position : _____ District: _____

Grade Level: _____ Average # of Students: _____

Please answer the following questions based on your experience and assessment of the workshop. **Circle** the response which best represents your assessment, using the scale below. For questions that require a written response, please use the space provided.

SA-Strongly Agree A-Agree UN-Undecided D-Disagree SD-Strongly Disagree

1. The information received about the workshop was accurate in its description.

SA A UN D SD

2. The workshop met my expectations.

SA A UN D SD

3. The workshop materials are applicable to my teaching assignment.

SA A UN D SD

Please explain the reasons for your response.

4. The workshop activities were helpful in facilitating my understanding of the learning cycle.

SA A UN D SD

5. List the most important/helpful activity.

OVER

6. If one activity had to be dropped, which one could be eliminated.

7. The workshop facilitators were effective in explaining the learning cycle.

SA A UN D SD

8. List the facilitators' strengths.

9. List the facilitators' weaknesses.

10. The **background information** in the workshop handbook was helpful.

SA A UN D SD

11. The **teacher perceptions and suggestions** in the workshop handbook was a useful section.

SA A UN D SD

12. The handbook lessons are presented clearly.

SA A UN D SD

13. The lessons in the handbook will be helpful.

SA A UN D SD

14. The **process skills information** in the handbook is useful.

SA A UN D SD

15. A day and a half workshop was effective in providing an introduction to the learning cycle.

SA A UN D SD

16. With the workshop and handbook, I will be able to prepare science lessons using the learning cycle this coming school year.

SA A UN D SD

17. I am excited about including the learning cycle in my teaching during the coming school year.

SA A UN D SD

18. I would be interested in attending a more indepth workshop about the learning cycle and its application to teaching science.

SA A UN D SD

19. Describe your expectations of the workshop.

20. Describe your overall assessment of the workshop. What were the highlights of the program?

21. What were the weaknesses of the program?

22. Additional comments.

SCIENCE TEACHING WORKSHOP
FOR TEACHERS OF THE HEARING IMPAIRED

WORKSHOP **FACILITATOR** EVALUATION

Please fill in the following information:

Workshop Site: _____

Number of
Participants : _____

Please answer the following questions based on your experience and assessment of the workshop. **Circle** the response which best represents your assessment, using the scale below. For questions that require a written response, please use the space provided.

SA-Strongly Agree  A-Agree  UN-Undecided  D-Disagree  SD-Strongly Disagree

1. I felt well prepared to lead this workshop.

SA  A  UN  D  SD

2. The workshop activities seemed to be helpful in facilitating the participants' understanding of the learning cycle.

SA  A  UN  D  SD

3. List the most important/helpful activity.

4. If one activity had to be dropped, which one could be eliminated.

5. The handbook was an effective resource for the workshop.

SA  A  UN  D  SD

6. List the most important/helpful section of the handbook.

7. List the handbook section that could be improved. How?

OVER

8. Describe how you feel the workshop went.

9. What suggestions do you have for improving the workshop?

10. Additional Comments.

SCIENCE TEACHING WORKSHOP
FOR TEACHERS OF THE HEARING IMPAIRED

LEARNING CYCLE LESSONS
COMMENT SHEET

Please provide the following information:

Lessons Used:

Unit Topic _____ Lesson # _____

Unit Topic _____ Lesson # _____

Unit Topic _____ Lesson # _____

Please share your comments about the topics listed below as to your experiences in presenting the learning cycle lessons.

1. Clarity of the lessons as presented in the handbook.

2. Students' reactions to the lessons.

3. Perceived differences in students' reactions to these lessons as compared to your typical approach to a science lesson.

OVER

4. Perceived differences in your role as "teacher" with these lessons as compared to your typical presentation of a science lesson.

5. Additional comments.

SCIENCE TEACHING WORKSHOP
FOR TEACHERS OF THE HEARING IMPAIRED

LEARNING CYCLE LESSONS
SECOND COMMENT SHEET

Please provide the following information:

Name : _____
School : _____ Grade Level: _____

Lesson Topic: _____

Please share your comments to the questions listed below as to your experiences in presenting the learning cycle lesson you created and presented.

1. Differences for you in developing and preparing this learning cycle lesson versus your typical science lesson.

2. Students' reactions to your learning cycle lesson.

3. Perceived differences in students' reactions to this lesson as compared to your typical approach to a science lesson.

OVER

4. Perceived differences in your role as "teacher" with this lesson as compared to your typical presentation of a science lesson.

5. Additional comments.